

## M-C POWER'S CURRENT COMMERCIALIZATION PROGRAM

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### INTRODUCTION

M-C Power is nearing the full commercialization of its MCFC power generation technology. There are many areas in which this technology required scale up and refinement to reach the market entry goals for the IMHEX7 molten carbonate fuel cell power plant. The primary areas that needed to be addressed were the manufacturing of the power module and operation in an integrated power plant. M-C Power has now manufactured and operated two (2) 250 kW and two (2) 75 kW MCFC stacks in an integrated power plant. This extended abstract highlights and supports the August 3, 1999 Joint DOE/EPRI/GRI Fuel Cell Technology Review Conference poster presentation.

### MANUFACTURING AND ENGINEERING

#### Objectives

Increase safety  
Improve component quality  
Increase manufacturing capacity of existing facility to 10 MW/yr  
Decrease costs  
Develop cost effective, high performance product and processes  
Use existing facilities as pilot plant  
Commercialize by 2002

#### Accomplishments

*Automated Batch Mixing System*- installed computerized system to simultaneously mix and directly feed materials to tape casters; metallic qualification in process; repeatability and re-producability improved; operator exposure reduced; capacity increased

*Tape Casters*- upgraded and qualified drying systems to increase belt speeds 2X within the last 12 months to exceed commercial targets; 10X increase in manufacturing capacity compared to 1994

*Sintering Furnace*- project in process to upgrade capacity 2X, increase MTBF and decrease MTTR; cathode sintering eliminated

*Electrode Inspection System*- installed computer controlled, SPC capable, semi-automated, integrated weighing and thickness inspection system; 50% reduction cycle time; 5X improvement in accuracy

- *Cutting Press*- modified to cut all active area components
- *Separator Plates*- completed design, scale-up to full area size and manufacturing of flat separator plates; improved sealing; automated grit blasting and aluminization operations; reduced aluminization

material costs by 32%; reduced heat treating costs by 3X

- *Mechanical/Flow Design*- instituted 2-D and 3-D modeling of full area cell packages, stacks, non-repeat part clamping systems and power modules; Reduced development to manufacture cycle time by 50%
- *Advanced Component Scale up*- scaled up manufacturing processes of advanced market entry cell package in commercial manufacturing mode
- *Simulations*- current and commercial factory manufacturing processes and layout simulations in process to model and improve capacity requirements planning

## **INTEGRATED MCFC POWER PLANT VERIFICATION**

### **Objectives**

- <Provide power plant operational data for future plant refinements
- <Conduct 75 kW testing followed by demo-plant testing
- <Evaluate commercial cell package
- <Optimize power plant start-up procedures
- <Evaluate effect of anode recycle
- <Test improved hot gas recycle blower and improved turbo-charger operations
- <Conduct thermal cycling test near end of 75 kW stack test

### **Accomplishments**

- Completed extended PAC testing with a full-area 75 kW stack at Marine Corps Air Station (MCAS) Miramar, CA. , 1<sup>st</sup> Quarter, 1999
- Assembled, tested and delivered a 75 kW to MCAS, 2<sup>nd</sup> Quarter 1999
- MCAS modified to simulate Demo unit operations and improve reliability
- Began operating at 75 kW power on 7/4/99; to date (7/23/99) 32 MWH DC output
- Demo BOP designed for high efficiency-- thermal integration, high cell performance, co-gen capability; expansion work recovery
- Demo BOP operations simplified B minimal controls; proven operating procedures; simple startup/shutdown; reliable equipment; functions integrated; unattended operations